

CLAIMS

1 1.. A catalyst system comprising:
2 a complex with the formula:
3 $[ML_y(HSR)_n]^n$
4 wherein M is a transition metal cation;
5 L is a ligand;
6 Y is a whole number between 0 and 5;
7 n is a whole number between 1 and 6;
8 n is the charge of the complex;
9 H is Hydrogen;
10 S is sulphur; and
11 R is any organic group or hydrogen.

1 2. The system of claim 1, wherein the transition metal is selected from the group
2 consisting of cobalt, manganese, chromium and iron.

1 3. The system of claim 2, wherein M is selected from the group consisting of Co^{2+} ,
2 Mn^{2+} , Fe^{2+} , and Cr^{3+} .

1 4. The system of claim 1, wherein the organic group is an alkyl or aryl group having
2 between one to twenty carbon atoms.

1 5. The system of claim 4, wherein the alkyl or aryl group contains sulphur, nitrogen
2 or oxygen atoms.

1 6. The catalyst of claim 1 wherein L is selected from the group consisting of cyano,
2 amino, aquo, hydroxo, thiocyanato, trifluoroborato, phosphino, nitro, nitrato, and
3 carboxo.

1 7. The catalyst of claim 1 wherein L is a chelating agent selected from the group
2 consisting of dimethylglyoxime, phenanthroline, and ethylenediamine.

1 8. A method of preparing a polymer comprising:
2 providing an organic compound to be polymerized;
3 contacting the organic compound with a catalyst represented by the formula:
4 $[ML_y(HSR)_n]^n$
5 wherein M is a transition metal cation in a lower oxidation state;
6 L is a ligand;
7 Y is a whole number between 0 and 5;
8 n is a whole number between 1 and 6;
9 n is the charge of the complex;
10 H is Hydrogen;
11 S is sulphur; and
12 R is any organic group or hydrogen.

1 9. The method of claim 8, wherein M is selected from the group consisting of cobalt,
2 manganese, chromium and iron.

1 10. The method of claim 8, wherein M is selected from the group consisting of Co^{2+} ,
2 Mn^{2+} , Fe^{2+} , and Cr^{3+} .

1 11. The method of claim 8, wherein the organic group is an alkyl or aryl group having
2 between one to twenty carbon atoms.

1 12. The method of claim 11, wherein the alkyl or aryl group contains sulphur, nitro-
2 gen or oxygen atoms.

1 13. The method of claim 11, wherein the organic compounds are selected from the
2 group consisting of olefins, conjugated dienes, vinyl compounds, allyl compounds and
3 mixtures thereof.

1 14. The method of claim 8, wherein the organic compound is selected from the group
2 consisting of styrene, methyl styrene, acrylonitrile, acrylic acid, methacrylic acid, ac-
3 rylamide, methacrylamide, methyl methacrylate, ethyl methacrylate, maleic anhydride,
4 maleic acid, fumaric acid, isoprene, butadiene, chloroprene, vinyl acetate, vinyl chlo-
5 ride, vinylidene chloride, ethylene, propylene, butylene, isobutylene, alpha-olefins, allyl
6 alcohol, alkyl vinyl ethers, and mixtures thereof.

1 15. The method of claim 8 wherein the organic compound to be polymerized is se-
2 lected from the group consisting of unsaturated polyester resins, vinyl ester resins, alkyl
3 resins, and glyptal resins.

1 16. The method of claim 8 wherein the method of preparing the polymer is selected
2 from the group of techniques consisting of the system of mass, solution, suspension and
3 emulsion.

1 17. The method of claim 11, and further comprising preparing the catalyst including
2 providing a transition metal containing compound selected from either the group
3 of inorganic salts consisting of sulphates, nitrates, phosphates, and chlorides, or the group
4 of organic compounds consisting of acetates, oxalates, hexanoates, octoates, oleates, de-
5 canoates, palmitates, decanoates, naphthenates, and stearates; and
6 contacting the transition metal containing compound with a thiol or mercaptan
7 having less than 20 carbon atoms.

1 18. The method of claim 17 wherein the sulphur compounds and thiols or mercaptans
2 are monofunctional and selected from the group consisting of hydrogen sulphide,
3 methyl, ethyl, propyl, butyl, hexyl, octyl, decyl, dodecyl, stearyl, benzyl, naphthyl, ben-
4 zoyl, mercaptans and thiols, thioglycolic acid, and any mercaptan or thiol containing
5 less than twenty carbons.

1 19. The method of claim 18 wherein the transition metal compound is a carboxylated
2 transition metal selected from the group of salts consisting of cobalt, manganese, chro-
3 mium, and iron salts, and the thiol or mercaptan includes a group selected from the group
4 consisting butyl, hexyl, dodecyl, benzyl, benzoyl groups, hydrogen sulphide, thioglyco-
5 lic acid, and any alkyl or aryl group containing one to twenty carbons atoms.

1 20. The method of claim 8, and further comprising preparing the catalyst including
2 providing a transition metal compound selected from the group of carboxylates
3 consisting of cobalt carboxylates, manganese carboxylates, chromium carboxylates and
4 iron carboxylates or from the group of inorganic salts consisting of sulphates, nitrates,
5 phosphates, and chlorides;
6 reacting an alkyl or aryl halide containing one to twenty carbon atoms with two
7 equivalents of aqueous thiourea to from a hydrolyzed product; and
8 reacting the product with the transition metal compound.

1 21. The method of claim 8, wherein L is selected from the group consisting of cyano,
2 amino, aquo, hydroxo, thiocyanato, trifluoroborato, nitro, nitrato, phosphino, and car-
3 boxo.

1 22. The method of claim 8, wherein L is a chelating agent and selected from the group
2 consisting of dimethylglyoxime, phenanthroline, and ethylenediamine.

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